book in nearly all our universities, was not to be permanently laid on the shelf. The friends of Professor Furman heard of his demise with the deepest regret, and it was with the greatest of pleasure that the writer learned that a lasting monument to his name was to be erected through the publishing of a sixth edition on "Assaying," revised and enlarged by Mr. W. D. Pardoe.

This book has been, and will continue to be, the standard on assaying for technical chemists, and for students in the universities which have a mining, metallurgical or any course on the quantitative determination of metals and their associated elements.

The aim of the author was to present to technical chemists and students of chemistry a *practical* book. That he succeeded is demonstrated fully by the demand for a sixth edition. In this book only the most approved methods of analysis have been chosen, and particular attention has been paid to rapid methods which are so indispensable to technical chemists employed on commercial enterprises. At the same time slower and more accurate methods are nearly always given, so that the analyst can use either, according to the dictates of the time at his disposal.

By the revision of the chapters on zinc, water and coal analyses, and the addition of methods for telluride ores, tungsten, molybdenum and vanadium, together with other minor changes, this book has been most thoroughly brought up to the present practise common in most of our large commercial laboratories.

The whole book is singularly free from lengthy theoretical discussions of the reactions taking place, but enough of the reasons "why" are given to enable the trained chemist to understand fully the methods he is pursuing. At the same time the chemist's assistant who may lack a college training can easily pick up "Assaying" and do good work if he follows carefully the very explicit directions.

If the writer may be allowed a word of friendly criticism, since the text is very clear and leaves little to be improved upon, it would seem in some cases as though this text could have been supplemented to a very great advantage to the student if more diagrams and illustrations of apparatus had been interpolated. For example, a picture or diagram of the quite complicated apparatus, such as is used for the determination of total carbon in the analysis of iron and steel, would go a long way toward helping the beginner in quantitative analysis to fully understand its setting up.

But taken altogether, the book is most admirably adapted for the teaching of assaying in a practical way, and is a most desirable addition to the chemist's library, be he beginner or an expert.

HENRY C. BOYNTON

TRENTON, N. J.

A Study of Splashes. By A. M. WORTHINGTON. With 197 illustrations from instantaneous photographs. London and New York, Longmans Green & Co.

"This publication," as the author says in his preface, "is an attempt to present in a form acceptable to the general reader the outcome of an inquiry, conducted by the aid of instantaneous photography, which was begun about fourteen years ago. . . ."

Every observant person must have at some time or other been impressed with the curious appearance of the splashes produced by rain drops falling into still water: the small pits or craters with little fountains in their centers, which sometimes rise above the surface to the height of an inch or more, can hardly fail to have attracted the attention of every one. In this book we find a collection of some of the most interesting photographs ever obtained by the aid of instantaneous photography. It is a volume of interest to old and young alike, and should be in the hands of every boy interested in natural phenomena. Some of the phenomena recorded by the instantaneous flash of the electric spark can be seen by ordinary eye observation. If a drop of milk is allowed to fall from a height of fifteen inches into a cup of tea or coffee, to which milk has not been added, observation shows us that the white drop appears to penetrate a short distance

into the dark liquid and then bounce out again. To find out what really happens we have only to inspect the photographs of the drop as it enters the liquid. It forms a hollow bowl or crater six or eight times its own size (in diameter), the milk flowing up the steep sides in radial streams; surface tension then pulls down the walls of the crater, the milk streaming back from all sides towards the center of the crater from which a fountain rises, carrying the reconstructed milk drop upon its summit.

Even more interesting is the study of the difference in the nature of the splash in the case of a highly polished marble and one which has had its surface roughened with sand paper. In the former case we have what Worthington has named the "sheath" splash, which is characterized by a very curious flowing up of the liquid around the surface of the sphere as it enters the water, the marble entering the liquid with little or no sound and the production of no bubbles. If the surface is roughened the liquid does not glide up the surface but shoots off tangentially to the sides, forming the "basket" splash, which is distinctly audible, and is followed by a violent bubbling of the liquid. The author advises every one to have a bag of marbles hung up in the bath-room, and repeat these experiments in the bath-tub. In addition to the wonderfully interesting photographs there is much valuable and entertaining descriptive matter, and the theory of the phenomenon of the splash is very fully discussed in its relation to surface tension, gravity, viscosity of the fluid, etc.

As the author points out a kinetoscope capable of securing a continuous series of pictures showing all of the various phases of a single splash is much to be desired. Such an instrument ought not to be difficult to construct. It would not be necessary to have the film brought to rest for each exposure, as is the case in the ordinary instrument, provided the illumination was effected by properly timed electric sparks. The most interesting stages of the phenomena are over in about two tenths of a second, and it would be necessary to secure about one hundred photographs during this space of time. When run through the machine at the rate of seven per second we should have a quarter of a minute to study the phenomenon. The sparks could be timed by putting a make and break in the primary circuit of an induction coil, so arranged as to be operated by the mechanism which carried the film along.

R. W. WOOD

SPECIAL ARTICLES

A NOTE CONCERNING INHERITANCE IN SWEET CORN

IN the polymorphic species, *Zea mays* L., the sweet corns, called *Zea saccharata* by Sturtevant, have been considered as a single subspecies group characterized by a hard, translucent and more or less shriveled condition of the endosperm. Correns[1] has shown that this character is due simply to an inability to complete the formation of normal maize starch, and further, that the presence and absence of this starch-forming ability act as an independent character pair in inheritance. No other feature is peculiar to the group: varieties characterized by black aleurone cells, red pericarp, yellow endosperm and the other salient points common to dent and to flint corns, are all found in the sweet corns. Their claim as a subspecies group thus rests entirely on the first-mentioned character.

The following evidence, however, indicates that sweet corn varieties do not belong to a unit group, but consist both of dent corns and of flint corns which have lost their original starch-forming power. This condition may have come about through mutation in each of these groups, but from what we know of the early history of the sweet corns, it is more likely that the change took place among the flint types and was extended by hybridization.

The dent corns are distinguished by a corneous starchy part of the endosperm which lies at the sides of the kernel and surrounds

[1] Correns, C., "Bastarde zwischen Maisrassen mit besonderer Berücksichtigung der Xenien," *Bibliotheca Botanica*, 1901.